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Analysis of Port Service Levels on the Performance of Tanjung Batu Tolitoli Crossing Port

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Abstract
Ferry Ports are sea, river, and lake ports used to serve ferry transportation which functions to connect the road network and/or railway network separated by waters to transport passengers and vehicles and their cargo. The Port of Tanjung Batu Tolitoli Crossing is a form of sea transportation service that is very meaningful for the development and progress of the Tolitoli Regency and its surroundings, therefore the completeness and feasibility of port infrastructure are very much needed to improve the performance of the port itself. The purpose of this study is to measure the level of port service according to service users, based on the completeness and adequacy of facilities and infrastructure, as well as the effect of service level on port performance. The research was conducted at the Tanjung Batu Tolitoli Ferry Port by distributing 100 questionnaires to respondents using port services. From the results of the research and analysis, it was found that there are 6 service factors at the port that affect port performance: safety, security, reliability/regularity, convenience, convenience/affordability, and equality. The results of the analysis of the level of passenger satisfaction using the Customer Satisfaction Index (CSI) method, obtained a satisfaction value of 39.65%, which is included in the category of less satisfied or not in accordance with the expectations of service users. The results of weighting the feasibility of Port facilities show that the aspects of safety, comfort, and equity are in the ineligible category, the security and convenience aspects are in the moderately feasible category while the reliability aspect is in the very feasible category. KMP service average time. Julung-julung at the Tanjung Batu Tolitoli Ferry Port is still quite a long time, namely 174.38 minutes. Using multiple linear regression analysis, it is found that the 6 service factors at the port can affect port performance by 68%. In order to improve the performance of the Port, it is necessary to rehabilitate all facilities at the Tanjung Batu Tolitoli Ferry Port, add supporting facilities such as CCTV, loudspeakers, fire extinguishers, evacuation routes, assembly points, breastfeeding rooms, weighbridges and gangways, port operational arrangements with a zoning system as well as regulating the circulation of the movement of vehicles and passengers.
Keywords: *Port Service Level, Port Performance, Tanjung Batu Tolitoli Ferry Port.*

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I. INTRODUCTION

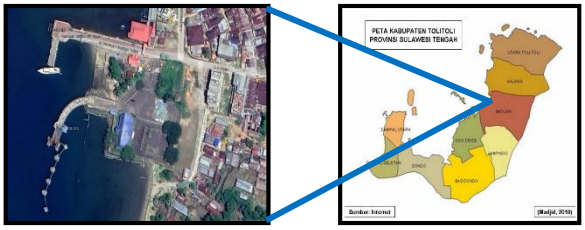
Ferry Ports are sea, river, and lake ports used to serve ferry transportation which functions to connect the road network and/or railway network separated by waters to transport passengers and vehicles and their cargo. The port is one of the very important links in the entire process of domestic and foreign trade. The Tanjung Batu Tolitoli Ferry Port is a port located in the Baru Village, Baolan sub-district, Tolitoli Regency, Central Sulawesi Province. Tanjung Batu Tolitoli Ferry Port is a class II port that serves shipping routes on the Tarakan – Tolitoli and Tolitoli – Tarakan routes. Based on data from the Central Sulawesi Province Land Transportation Management Office for Region XX and PT. ASDP Balikpapan Branch throughout 2022, crossing traffic at the Tanjung Batu Tolitoli Ferry Port, both departing and arriving, reached 3957 adult passengers and 340 child passengers. Meanwhile, this route carries a lot of class 2 vehicles (2-wheeled vehicles) of 370 units, and class IV (passenger cars) of 197. Compared to 2021, there are a total of 1494 adult passengers and 258 child passengers. However, in reality, the current condition of the Tanjung Batu Tolitoli crossing port is still very far from the expectations of service users because the infrastructure facilities at the port are mostly in a damaged condition and even unfit for use, and this has reduced public interest as users of ferry transportation services. or decreased. The service performance provided by Port operators at the Provincial Government is still far from the expectations of service users because the condition of the wharf that cannot be passed by heavily loaded vehicles causes many vehicles to cancel their departure. This also happens during Eid and holidays, a large number of vehicles will cross from Tolitoli to Tarakan and vice versa, simply because the pier facilities are not good so they cannot be

departed considering the risk when passing the Moveable pier bridge which has been damaged so that it cannot be served by the ASDP. Likewise the parking area around the port, during holidays and Eid, vehicles cannot be accommodated in the port parking area, because the zoning arrangements are not well organized, this is due to a lack of human resources on duty at the port. Not only that, many supporting facilities in the port area are considered inadequate, such as broken public toilets, lack trash cans, so that garbage is often found scattered around the port area. The terminal room for departure and arrival of passengers has now changed its function so that it cannot be used anymore, passengers when departing immediately walk from the parking lot to the ship. The condition of the asphalt in the port area has also been damaged, and there are also no fire extinguishing facilities found in the port area. Seeing the condition of the Tanjung Batu Tolitoli Ferry Port, it is necessary to repair/rehabilitate or revitalize the Port with the aim that the performance of the Tanjung Batu Tolitoli Ferry Port will be even better so that it can attract people to use ferry services as an alternative mode of transportation between Provinces. This study aims to measure the service level of the Tanjung Batu Tolitoli Ferry Port according to the service user community, measure the level of Port service in terms of the completeness and feasibility of facilities and infrastructure, measure the relationship between the level of Port service and the performance of the Ferry Port and determine the development strategy that should be carried out by the port manager. in improving the quality and performance of the Tanjung Batu Tolitoli Ferry Port.

II. RESEARCH METHODS

2.1 Research Locations

The location of this research was carried out at the Tanjung Batu Tolitoli Ferry Port, Baru Village, Baolan District, Tolitoli Regency, Central Sulawesi Province, currently the port is managed by the Central Sulawesi Province Transportation Service and Supervision by BPTD Wil. XX Province of Central Sulawesi and ship operator by PT. ASDP Indonesia Ferry (Persero), geographically, Tolitoli Regency is located at 1° 2'16.93"N and 120°48'36.14"E.



2.2 Population, Sample and Sampling Technique

Based on data from visitors and service users of the Tanjung Batu Tolitoli Ferry Port obtained from data from the Land Transportation Management Office for Region XX of Central Sulawesi Province from July 2022 to December 2022 the total population of visitors and service users of the Tanjung Batu Tolitoli Ferry Port is an average of more than 100 people, the researchers took 100 respondents from the total population of visitors and service users at the Tanjung Batu Tolitoli Ferry Port.

2.3 Data analysis

2.3.1 Validity Test and Reliability Test

This validity test is carried out to measure whether the data that has been obtained after the research is valid data or not, using the measuring instrument used (questionnaire).

$$\text{r count} = \frac{n\sum X.Y-(\sum X.\sum Y)}{\sqrt{\{n\sum X^2-(\sum X^2)\{n\sum Y^2-(\sum Y)^2}} \ldots\ldots (1)$$

Reliability test is the extent to which measurement results using the same object will produce the same data, using questions that have been declared valid in the validity test and reliability will be determined.

$$r = \left[\frac{k}{(k-1)}\right]\left[1-\frac{\sum S_b^2}{S_1^2}\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

2.3.2 Analysis of Service User Satisfaction Levels and Conditions of Port Services

Analysis of service user satisfaction levels and service conditions at this port uses the *Customer Satisfaction Index (CSI) method* , which is a measurement scale that describes the level of customer satisfaction with a product. *The Customer Satisfaction Index (CSI)* is used to determine the overall level of customer satisfaction by looking at the level of importance of product attributes.

$$CSI = \sum \frac{K=1^{pWSi}}{HS(5)\ x\ 100\%} \quad \ldots\ldots\ldots\ldots (3)$$

2.3.3 Analysis of Completeness and Feasibility of Port Facilities and Infrastructure

This analysis is carried out by measuring port facilities and inventorying the condition of port infrastructure based on an objective assessment. This analysis is used to determine ship service time, physical performance and use of port infrastructure. By calculating the ship's service time, inventory survey on parts of port facilities, both the main facilities and supporting facilities, the feasibility of the port facilities and infrastructure can be determined. Weighting analysis is used to quantify the parameters using the following formula:

P= F/(N) x 100% …….. (4)

Ship service time is the time allotted to the ship to carry out maneuvers to dock at the pier, open ramp doors, unload cargo, load, close ramp doors, arrange Sailing Approval Letters (SPB) and maneuver maneuver out of the harbor pool. To determine the ship's service time, it is obtained from the results of calculating the ship's standard time plus the time to open and close the rampdoor and the time for processing the sailing approval letter (SPB).

2.3.4 Feasibility Analysis of Port Services on Port Performance

Analysis using the regression analysis method is one of the data analysis techniques in statistics which is often used to examine the relationship between variables and predict a variable. The goal of multiple linear regression analysis is to measure the intensity of the relationship between two or more variables and make predictions about the approximate value of Y over X. In multiple regression, it is assumed that we have an independent change in Y that depends on a number of independent changes X1, X2, ……. , Xp. The mathematical equation is stated as follows:

$Y = a + b_1 X_{1i} + b_2 X_{2i}$ …….... (5)

1) Research variable
   - Independent variable (*independent variable*) is a variable that influences or causes a change or the emergence of the dependent or dependent variable , the variables in this study are Safety (X1) , Security (X2) , Reliability (X3) , Convenience (X4) , Convenience (X5) , Equality (X6) .
   - The dependent variable *is* the variable that is affected or becomes the result because of the independent variables. The variable in this study is Port Performance.
2) The t test aims to determine whether the independent variable (X) has a significant effect on the dependent variable (Y).

   $t_{count} = \frac{b}{sb}$ ……..… (6)
3) The F test is used to determine whether the independent variables simultaneously have a significant effect on the dependent variable.

   $F\ count = \frac{R^2 / k}{(1 - R^2)/(n-k-1)}$…… (7)
4) Determination analysis in multiple linear regression is used to determine the percentage of the contribution of independent variables simultaneously to the dependent variable.

   $R^2 = \frac{(ryx_1)^2 + (ryx_2)^2 - 2.(ryx_1).(ryx_2).(rx_1rx_2)}{1 - (rx_1rx_2)^2}$. (8)

2.3.5 Strategic Analysis of Port Development Plans

1) *Compounding Factor* Analysis

   This analysis is used to forecast the growth in the number of passengers and vehicles at Tanjung Batu Tolitoli Port

   $Pt = Po\ (1 + i)^n$…….…… (9)
2) Land Facility Needs Analysis
   - Waiting Room (a1)

     a1 = axnx N x X x Y …… (10)
   - Canteen (a2)

     a2 = 15 % x a1 ……... (11)
   - Administration Room (a3)

     a3 = 15 % x a1 ……..... (12)
   - Utility Room (a4)

     a4 = 25 % x (a1 + a2 + a3) ….. (13)
   - Public Space (a5)

     a5 = 10 % x (a1 + a2 + a3 + a4) (14)
   - Total Area of Terminal Building (A)

     A = a1 + a2 + a3 + a4 + a5 …… (15)
   - Parking Lot Ready to Load

A = axnx N x X x Y …… (16)

- Delivery and Pick-up Parking
  A = ax n1 x N x X x Y x Z x 1/n2 17)
- Fuel Facilities Area (Bunker) , Clean Water Facilities Area , Generator Area, Religious Facilities Area, Health Facilities Area, Post and Telecommunications Facilities Area , Fire Extinguishing Facilities, Weighbridge, Gangway, Trade Facilities Area .

III. RESULTS AND DISCUSSION

3.1 Analysis of Service User Satisfaction Levels and Conditions of Port Services

3.1.1 Service User Satisfaction Level Analysis

Analysis of the satisfaction level of service users at the Tanjung Batu Tolitoli Ferry Port is calculated using *the Customer Satisfaction Index (CSI)* . This analysis uses several indicators, based on Minister of Transportation Regulation Number 39 of 2015 concerning Service Standards for Crossing Passengers (main routes), some of these indicators are safety, security, reliability and regularity, comfort, convenience/affordability and equality of calculations using the following formula :

$CSI = \sum \frac{K=1^{pWSi}}{HS(5)\ x\ 100\%}$

$CSI = \sum \frac{199,31}{5\ x\ 100\%} = 39.86\ \%$

Based on the results of the analysis, the satisfaction level of service users regarding services at the Tanjung Batu Tolitoli Ferry Port is 39.86% and is still included in the unsatisfied category.

3.2 Analysis of Completeness and Feasibility of Port Facilities and Infrastructure

3.2.1 Port Infrastructure Completeness and Feasibility Analysis

The analysis is carried out by calculating the weight of each aspect of port services. Based on the results of the total availability of each type of service facility from the total number of benchmarks according to the table above, it can be calculated % of the feasibility weight of each type of service facility. After carrying out the feasibility % weight analysis, the next step is to analyze the interval range scale to determine the results of the answer categories from the known % weight values, the following results are obtained:

No	Kind of service	Weight (%)	Results Category Answers
1.	Safety	0 %	Not feasible
2.	Security	50 %	Decent Enough
3.	Reliability/Regularity	100 %	Very Worth it
4.	Comfort	11 %	Not feasible
5.	convenience	56 %	Decent Enough
6.	equality	0 %	Not feasible

3.2.2 Port Facility Analysis

Ship service time at the port can be known from the calculation of the ship's standard time plus the time to open and close the rampdoor and the processing time for the sailing approval letter (SPB). The following is the result of calculating the ship's service time at the Tanjung Batu Tolitoli Ferry Port. From the calculation table above, the data for the fastest ship service time is 161.01 minutes, while the longest ship service time is 181.10 minutes. So the average ship service time is KMP. Julung-julung at the Tanjung Batu Tolitoli Ferry Port during the observation was 174.38 minutes. It can be said that this service time is not appropriate and long, so that it can create disappointment for Port service users.

3.2.3 Feasibility Analysis of Port Services on Port Performance

3.2.3.1 Validity Test

Based on the results of the validity test carried out using the SPSS version 17 program on 20 variables, the results showed that there was 1 variable that was declared invalid because the p-value <0.197. So that there are 19 variables in this research instrument that are valid and can be investigated further.

3.2.3.2 Reliability Test

Based on the reliability test conducted for the question items, the Cronbach Alpha Statistical Test value was 0.649, meaning that the result was greater than 0.6 at a 5% confidence interval. Thus the data used meets the reliability assumption.

3.2.3.3 T-test (partial test)

From the results of data processing, the sig values were obtained for variables X1 to X6 each has a value < α (0.05) so that it can be concluded that there is a partial effect of each variable X 1 to X6 on variable Y

3.2.3.4 F Test (Simultaneous Regression)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.848.649	6	308.108	33.303	.000[b]
	Residual	869.648	94	9.252		
	Total	2.718.297	100			

a. Dependent Variable: Y (Tingkat Kinerja)

b. Predictors: (Constant), X6 (Kesetaraan), X4 (Kenyamanan), X5 (Kemudahan/keterjangkauan), X1 (Keselamatan), X3 (Kehandalan/Keteraturan), X2 (Keamanan)

From the results of data processing, because the value of Siq (0.000) < α (0.05) so reject H0 or in other words, there is an effect of the independent variable X simultaneously on variable Y.

3.2.3.5 Test of the Coefficient of Determination (R^2)

From the results of the data analysis, there are 6 service factors at the Ferry Port that affect the performance of the Ferry Port, these 6 factors are safety, security, reliability/regularity, comfort, convenience/affordability, and equality. From Table 5.21, the value of R Square is 0.680. This means that 68.0% of the independent variable X1 to X6 contributes to the dependent variable Y, while the remaining 32.0% is a contribution from other variables outside the model.

3.3 Port Development Plan Strategy Analysis

3.3.2 Passenger and Vehicle Forecasting

The latest data for 2022 at the Tanjung Batu Tolitoli Ferry Port recorded a total of 4564 passengers and an increase of 16% from the total passengers two years earlier. In the next 5 years, it is estimated that there will be an increase in passengers by 9,727 people. As for vehicles, it is estimated that there will be an increase of as much as Gol. II 3913 units, Gol. IV A 3340 units, Gol. IV B 129 units, Goal. VA 66 units, Goals. VB 1660 units, Goals. VI B 352 units, and Goal. VIII 160 units.

3.3.3 **Port Development Strategy Analysis**

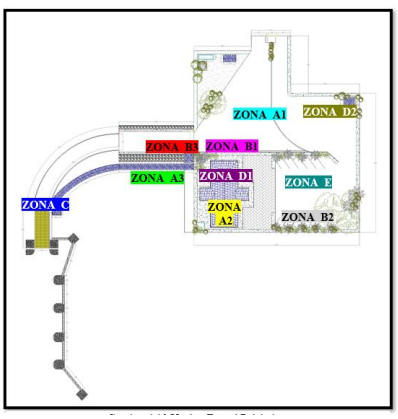
To anticipate an increase in the number of passengers and vehicles at the Port of Tanjung Batu Tolitoli for the next 5 years, an analysis of land facility needs is needed to improve service for passengers.

3.3.4 Proposal of Completeness of Port Facilities

To improve services at the Tanjung Batu Tolitoli Ferry Port, it is necessary to add and complete several facilities including fire extinguishers, evacuation route instructions and evacuation assembly points, health information and facilities, CCTV, lighting lamps, speakers, breastfeeding rooms, weigh bridges, and Gangways.

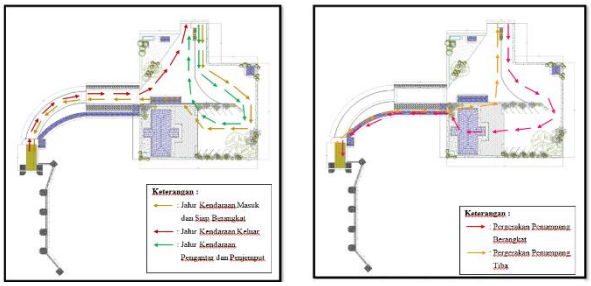
3.3.5 Port Zoning Proposal

To improve and optimize Port operational services Based on the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 91 of 2021 concerning Zoning in Port Areas Used to Serve Ferry Transport the Tanjung Batu Tolitoli Ferry Port can be proposed to use a zoning system, with the zoning division as follows:



3.3.5 Proposed Vehicle and Passenger Circulation

The proposed circulation of vehicles and passengers aims to regulate and control vehicle traffic in the port area and the movement of service users at the Tanjung Batu Tolitoli Ferry Port. The proposed circulation of vehicles and passengers given are as follows:



IV. CONCLUSION

1. The results of *the Customer Satisfaction Index* show that the percentage of user satisfaction ratings is **39.65%**, which is included in the less satisfied category.
2. The results of weighing the feasibility of the facility, obtained the type of service safety at 0% (not feasible), security at 50% (reasonable enough), reliability/regularity at 100% (very feasible), convenience at 11% (not feasible), convenience 56% (decent enough), 0% equality (not feasible). The ship's service time is 174.38 minutes, the service time is quite a long time.
3. The 6 service factors at the Ferry Port greatly affect the performance of the Port, namely 68.0% of the contribution of the independent variables X1 to X6 to the dependent variable Y (Port Performance).
4. Proposals for improving facilities are urgently needed to improve Port services in accordance with the Minimum Service Standards

REFERENCES

[1]. Arikunto, Suharsimi. (2012). Research Procedures A Practice Approach. Jakarta: Rineka Cipta
[2]. Aritonang, Lerbin R. 2005. Customer Satisfaction. Measurement and Analysis with SPSS. Gramedia Pustaka Utama, Jakarta.
[3]. Capt. RP, Suyono. 2007. Shipping Import Export Intermodal Transport by Sea. Jakarta: PPM Publisher.
[4]. Corder, AS (1996), Maintenance Management Engineering, Erlangga, Jakarta.
[5]. Duwi Priyatno. (2010). "5 Hours of Learning to Process Data with SPSS 19". Yogyakarta: Andi
[6]. Danisworo, 2002 the notion of revitalization, (online) http://makalahdankrip.blogspot.com/2009.03/definifi-revitalization.html accessed 30 october 2011
[7]. Firmansyah SY., Anwar M. Ruslin, Pujiraharjo Alwafi. 2016. Study of Makassar Port Development in Supporting Loading and Unloading Flows at Makassar Port. Civil Engineering, Volume 10 Number 1, Pg. 10-20.
[8]. Gultom, Alfreda. 2017. Ports of Indonesia as a Contributor to State Foreign Exchange in the Perspective of Business Law. Kanun Journal of Law, Volume 19 Number 3, Pg. 419-444.
[9]. Hidayat, Eddy. 2009. Port Planning, Design and Development. Port Reference Series 03 Edition 2. Jakarta: PT. Indonesian Harbor I, 2, 2I, IV.
[10]. Kairupan, Liani Anggreini. 2019. Ulu Siau Port Development Planning. Journal of Civil Statistics, Volume 7 Number 1, Pg. 81-86.
[11]. Employees, IDMA (2012). Analysis of Ship Service Standard Time at Ferry Ports sheet. Engineering Engineering, 13(1), 62-72.
[12]. Chestnut, Jori, George, Kherel. 2013. Planning for Development of Serui Seaport in Serui City, Papua. Journal of Civil Statistics, Volume Number 4, Pg. 233-239.
[13]. Kutner, MH, Nachtsheim, CJ, and Neter, J. (2004). Applied Linear Regression Models. Fourth Edition. McGraw-Hill Companies, Inc., New York
[14]. Ministry of PUPR, 2010. Minister of Public Works Regulation No. 18 of 2010 concerning Guidelines for Area Revitalization.
[15]. Ministry of Transportation, 2015. Regulation of the Minister of Transportation Number 39 concerning Service Standards for Crossing Passengers.
[16]. Ministry of Transportation, Jakarta. Ministry of Transportation, 2016. Regulation of the Minister of Transportation Number 29 concerning Sterilization of Ferry Ports, Jakarta.
[17]. Ministry of Transportation, 2020. Decree of the Minister of Transportation Number 313 concerning Guidelines for Determining Crossing Port Master Plans.
[18]. Ministry of Transportation, 2021. Minister of Transportation Regulation Number PM 60 concerning the Second Amendment to the Minister of Transportation Regulation Number PM 104 of 2017 concerning Implementation of Crossing Transportation.
[19]. Ministry of Transportation, 2021. Regulation of the Minister of Transportation Number PM 50 concerning the Implementation of Seaports.
[20]. Ministry of Transportation, 2021. Minister of Transportation Regulation Number PM 91 concerning Zoning in Port Areas Used to Serve Ferry Transportation.
[21]. Ministry of Transportation, 2004. Regulation of the Minister of Transportation Number KM 52 Concerning the Implementation of Ferry Ports.
[22]. Ministry of Transportation, Central Sulawesi Class II Land Transportation Management Center, Monthly Report on Production Data of the Tanjung Batu Tolitoli Ferry Port.
[23]. Kuncoro, Mudrajad. 2005. Strategy How to Achieve Competitive Advantage. Jakarta: Erlangga.

[24]. Laretna, Adishakti. 2002. Revitalization is Not Just "Beautification". Urdi Vol.13, www.urdi.org (Urban and Regional Development Institute)
[25]. Lasse, DA 2016. Port Management. Jakarta : RajaGrafindo Persada.
[26]. Maulia, Afrinda Hajar. 2012. Development of Baubau Port in Supporting Intrasulair Trade. (Unpublished Thesis), Graduate Program Hasanuddin University Makassar.
[27]. Narimawati, Umi. 2008. "Qualitative and Quantitative Research Methodology, Theory and Application." Bandung: Agung Media 9
[28]. Patunru, Arianto A. 2007. The Economic Change of the Tourism Environment in Tanjungpinang: Application of the Random Utility Model. Journal of Economic Policy Journal and Proceedings, Volume 2 Number 3, Pg. 211-219.
[29]. Putra, AA and Djalante, S. 2016. Port Infrastructure Development in Supporting Sustainable Development. Media Engineering Scientific Journal, Volume 6 Number 1, Pg. 433-443.
[30]. Grab it, Freddy. 2012. Business & Investment Feasibility Study. Jakarta: Gramedia Pustaka Utama.
[31]. Sakti, Adji, Adisasmita. 2011. Transportation and Regional Development. Yogyakarta: Science Graha.
[32]. Saleh, Chairul Imam. 2013. Strategy Analysis for the Development of Main Ports in the Sulawesi Corridor. (Not Published Thesis), Shipbuilding Engineering Study Program, Faculty of Engineering, University of Hasanuddin Makassar.
[33]. Siagian, Sondang P. 2000. Development Administration (Concepts, Dimensions and Strategies). Jakarta: Earth Script.
[34]. Solossa Appi Yamsos, Paransa MJ, Elisabeth Lintong, Sendow Kindergarten 2013. Planning for the Development of Sorong Seaport in Sorong City. Journal of Civil Statistics, Volume 1 Number 10, Pg. 645-652.
[35]. Sugiyono. 2017. Quantitative, Qualitative and R&D Research Methods. Bandung: PT. Alphabet.
[36]. Sugiyono. 2020. Quantitative, Qualitative and R&D Research Methods. Bandung: PT. Alphabet.
[37]. Suyono, RP (2017). Shipping Import Export Intermodal Transportation by Sea Edition IV. Jakarta: PPM
[38]. Triatmodjo, B. 2009, "Port Planning", Beta offset , Yogyakarta.
[39]. Wireman, T. (2005). Total Productive Maintenance. New York: Industrial Press Inc